



August 1, 2001

**DESIGN MEMORANDUM No. 01-10**  
**TECHNICAL ADVISORY**

**TO:** All Design, Operations, and District Personnel, and Consultants

**FROM:** /s/ Anthony L. Uremovich  
Anthony L. Uremovich  
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Contracts and Construction Division

**SUBJECT:** Subgrade Treatment and Chemical Soil Modification

**EFFECTIVE:** March 19, 2002, Letting

**INTRODUCTION**

The practice of specifying 0.6 m (24 in.) special subgrade treatment has been revised. The subgrade treatment options where the subgrade is at the natural ground line, below the natural ground line in cut (excavation), or in cut-to-fill (embankment) transition areas will vary. Factors affecting the types of subgrade treatment to be used include the roadway annual average daily traffic (AADT), the subgrade treatment area, and the soil type.

**EXPLANATION OF FACTORS**

The AADT will be the anticipated daily design year traffic.

The subgrade treatment area should be computed by multiplying the length of the subgrade to be treated parallel to the roadway centerline times the lateral width of the subgrade. Such lateral width should be measured between the shoulder break points for shoulder sections or measured between the back faces of the curbs for curbed sections. The estimated area of subgrade treatment should be shown on the plans, so that the contractor may more accurately determine the materials needed for the subgrade treatment. The computed area will be in square meters (square yards). All isolated subgrade treatment areas within the project limits, including those on S-lines, should be summed to obtain the total subgrade treatment area for the entire project. Divided highways may have parallel but separate subgrade treatment areas depending upon the width of the median.

Typically, a roadway project will contain several cut and fill areas within the project limits. Fill areas above the natural ground line should not be included in the computation.

The soil types encountered at various locations within the project limits and the recommended soil treatment for each type should be set forth in the geotechnical report.

## **CHEMICAL SOIL MODIFICATION**

The existing ground upon which embankment is to be placed is now considered to be subgrade and is defined as embankment foundation. Chemical modifiers may be required to stabilize these embankment foundation soils where designated in the geotechnical report. The use of chemical modifiers for stabilizing embankment foundation area soils has been incorporated into Standard Specifications Section 215.

## **SUBGRADE TREATMENT**

The subgrade treatment options available to the contractor are as follows. The subgrade treatment compacted to density and moisture requirements may consist of granular soils classified in accordance with AASHTO M 145 as A-1, A-2, or A-3. If this condition exists, the designer should indicate so in the geotechnical report summary.

### **AADT \$ 3,000; Subgrade Area $\geq 8500 \text{ m}^2$ (10,000 yd<sup>2</sup>)**

The contractor shall choose one of the subgrade treatments as follows:

400 mm (16 in.) of chemical soil modification

300 mm (12 in.) excavated and replaced with compacted aggregate size No. 53

600 mm (24 in.) compacted to density and moisture requirements. This choice is only permissible if soils are granular and classified in accordance with AASHTO M 145 as A-1, A-2, or A-3.

### **AADT \$ 3,000; Subgrade Area $< 8500 \text{ m}^2$ (10,000 yd<sup>2</sup>)**

The contractor shall choose one of the subgrade treatments as follows:

300 mm (12 in.) excavated and replaced with compacted aggregate size No. 53

600 mm (24 in.) compacted to density and moisture requirements.

### **$500 \leq \text{AADT} < 3,000$ ; Subgrade Area $\geq 8500 \text{ m}^2$ (10,000 yd<sup>2</sup>)**

The contractor shall choose one of the subgrade treatments as follows:

200 mm (8 in.) of chemical soil modification

150 mm (6 in.) excavated and replaced with compacted aggregate size No. 53

300 mm (12 in.) compacted to density and moisture requirements. This choice is only permissible if soils are granular and classified in accordance with AASHTO M 145 as A-1, A-2, or A-3.

**$500 \leq \text{AADT} < 3,000$ ; Subgrade Area  $< 8500 \text{ m}^2$  (10,000 yd<sup>2</sup>)**

The contractor shall choose one of the subgrade treatments as follows:

150 mm (6 in.) excavated and replaced with compacted aggregate size No. 53

300 mm (12 in.) compacted to density and moisture requirements.

**$\text{AADT} < 500$ ; Subgrade Area  $< 8500 \text{ m}^2$  (10,000 yd<sup>2</sup>)**

The contractor shall choose one of the subgrade treatments as follows:

150 mm (6 in.) excavated and replaced with compacted aggregate size No. 53

150 mm (6 in.) compacted to density and moisture requirements.

Where chemical modifiers are required, the Department has developed specific percentages of chemical modifiers to aid contractors in the bidding process. Standard Specifications Section 215.03 specifies that bidding will be based on 4.0 " 0.5% by dry unit weight of soils for hydrated lime, quicklime, or portland cement; 5.0 " 1.0% for lime by-products; and 12.0 " 2.0% for fly ash. If the contractor's soils tests indicate that more or less chemical modifier is required, the project engineer/supervisor will initiate a force account to account for the over- or underrun of materials only.

## **SUBGRADE TREATMENT PAY ITEMS**

The code number and pay item for subgrade treatment is 207-06499, Subgrade Treatment. Chemical modifiers which may be required for subgrade treatment are included in the subgrade treatment pay item. The pay unit is square meter (square yard). The code number and pay item for chemical modification of embankment foundation is 215-07043, Chemical Modification, Soils. The pay unit is square meter (square yard).

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